



Welding

Revision and Approval

Revision	Date	Nature of Changes	Approved By
0	10-28-2022	Original issue	Richard Foley

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Background

This process establishes Structure Construction (SC) responsibilities and procedures for the review and authorization of the following:

- General requirements for welding that apply to all structural welding as specified in the [contract documents](#).
- Welding quality control (QC) plan
- Submittals and welding inspection for overhead sign structures, standards, and poles.

SC staff are involved in both structural and nonstructural welding, whether performed in a shop or in the field. Contract requirements for welding of:

- Structural steel members is covered under the [Contract Specifications](#) (CS), Section 55, *Steel Structures* and Section 75, *Miscellaneous Metal*.
- Reinforcement is covered under CS, Section 52, *Reinforcement*.
- Overhead sign structures, standards, and poles is covered under the CS, Section 56-2, *Overhead Sign Structures, Standards, and Poles – Overhead Sign Structures*, and Section 56-3.02, *Overhead Sign Structures, Standards, and Poles – Standards, Poles, Pedestals, and Posts – Steel Standards, Poles, Pedestals, and Posts*.
- All other welding applications are covered in their specific section of the CS, which includes Section 48, *Temporary Structures*; Section 49, *Piling*; Section 51, *Concrete Structures*; and Section 60, *Existing Structures*.

Prior to reviewing this Bridge Construction Memo (BCM), it is essential to review the CS, Section 11, *Welding*, that this BCM is based on as identified in the title block above. The information in the *Contract Specifications* typically will not be repeated in the text of this BCM.

Process Inputs

1. Contract work requiring welding
2. Welding Quality Control Plan (WQCP)
3. Welding Reports
4. Materials Engineering and Testing Services (METS) reports

Procedure

1. All work associated with this process is charged as [Project Direct – Construction](#)
2. Inspection of field work for this process is:
 - a. [Intermittent](#) – for field welding
3. Before construction begins the Structure Representative (SR) or delegate must:
 - a. Review the:
 - i. Contract documents to prepare for and identify any potential constructability issues for welded components. For example, when reviewing the structure sheets, verify the details provide sufficient clearance for welding and the welding details are compatible.
 - ii. Following welding and material codes specified in the contract documents, which can be accessed using the [Engineering Workbench](#) section of the Caltrans Transportation Library (Note – registration required):
 1. The American Society for Testing and Materials (ASTM)
 2. The American Welding Society (AWS) manuals
 - iii. *METS [Quality Assurance and Source Inspection](#) (QASI) [Manual](#)*, Section 11, *Welding*, for quality assurance (QA) inspection responsibilities and prewelding meeting information.
 - iv. Project Code of Safe Practices (COSP) for safety considerations for welding and flame cutting. Revise the Project COSP if information needs to be modified for cutting or welding on existing steel containing lead based coating systems or stainless steel.
 - v. *[Caltrans Employee Safety Manual](#)*, Chapter 12, *Personal Protective Equipment (PPE)*, and Chapter 15, *Respiratory Protection Program*.

- vi. [Attachment 1](#), *Welding Terms*.
- b. Discuss constructability issues with Bridge Design (BD) Structure Project Engineer and the METS Material Representative ([Mets Rep](#)) for resolution.
- c. Contact the BD Structure Project Engineer to determine if they need to attend the prewelding meeting or have information that you can cover at the prewelding meeting.
- d. Contact the METS Rep to:
 - i. Review the anticipated welding work, site conditions, and project work schedule.
 - ii. Clarify any differences in the interpretation of the contract documents and welding requirements.
- e. For work performed to CS, Section 11-2, *Welding – Welding Quality Control*:
 - i. Contact the METS Rep to discuss the following regarding the prewelding meeting:
 - 1. The Structure Representative coordinates with the Resident Engineer and the METS Rep to hold the prewelding meeting with the Contractor.
 - 2. The METS Rep chairs the prewelding meeting per the *QASI Manual*, Section 11-A.03, *Prewelding Meeting*.
 - 3. The METS Rep provides the prewelding meeting agenda using the [METS Handout for Pre-Welding Meeting Agenda Sample](#) on the METS J2 drive which is customized for the project.
 - 4. Topics that will be discussed at the prewelding meeting, including topics the Structure Representative (SR) will address.
 - ii. Review with the Contractor at the preconstruction conference, the scheduling of separate prewelding meetings.
 - iii. Schedule and attend prewelding meetings with the Contractor, their QC manager, and representatives from each entity performing welding or inspection on the contract.
 - iv. Receive the Welding Quality Control Plan (WQCP) and begin the process to:
 - 1. Review for completeness and forward to the METS Rep or review.
 - 2. Maintain a log to track review times of all the WQCPs.
 - 3. Authorize the WQCP pursuant to the METS Rep's review:
 - a. Stamp all sheets in the WQCP before returning to the Contractor for distribution to the work locations.

- b. Receive the seven copies of the authorized WQCP from the Contractor to stamp and return.
 - c. Provide one copy of the authorized WQCP to the METS Rep.
 - f. For overhead sign structures, standards, and poles:
 - i. Verify that the proposed fabrication shop is on the METS [Authorized Facility Audit List](#).
 - g. Verify that the fabrication facility possesses the necessary American Institute of Steel Construction Quality or other certifications as required by the contract.
 - h. Obtain additional training or information on welding from the Bridge Construction Engineer as needed.
4. During construction the SR or delegate must:
- a. For shop welding:
 - i. Contact the METS Rep to confirm that METS is verifying and documenting welding procedures.
 - ii. Verify that inspection requests are being sent to METS Rep by the Contractor and/or fabricator.
 - iii. Monitor the progress of fabrication and note any welding issues by:
 - 1. Reviewing METS inspection reports.
 - 2. Meeting with the METS Rep on issues involving non-conforming welds that cannot be resolved in the shop to:
 - a. Determine the extent and background of the issue.
 - b. Involve BD Structure Project Engineer for resolution or if a fit for purpose acceptance may need to be considered.
 - c. Determine if the issue needs to be elevated to the Bridge Construction Engineer (BCE) for resolution.
 - iv. Verify that shop welded products are paired with the proper release documents in the field.
 - v. Contact the METS Rep:
 - 1. When any product released from the shop appears to be non-compliant.
 - 2. To schedule and perform additional QA inspection.
 - 3. To request, review, authorize a mitigation plan from the Contractor.
 - vi. Receive welding reports from the Contractor and:

1. Forward a copy to the METS Rep for review.
 2. Monitor review times to stay within the allotted 15-day timeframe.
 3. Authorize or reject welding reports based upon guidance from the METS Rep.
- b. For field welding performed to CS, Section 11-2, *Welding – Welding Quality Control*:
- i. Before field welding:
 1. Verify release of base material. Collect METS release tags and pair with METS [Form TL-0029](#), *Report of Inspection of Material*.
 2. Verify the Contractor has submitted timely inspection request forms.
 3. Verify the Contractor has provided suitable access for the weld activity (scaffold, ventilation, shoring, etc.)
 - ii. During field welding:
 1. Verify that all Procedure Qualification Record (PQR), Welder Certification test have been performed and witnessed by the METS Rep.
 2. Document certified welding inspector (CWI), crew, resources, and production rates.
 - a. Verify that the CWI is on site during welding operations.
 3. Verify the QC manager submits the Welding Reports within seven (7) days after any welding is performed.
 4. Receive, review, and authorize, with assistance from the METS Rep, repair plans not already addressed in the WQCP for any weld defects.
 5. Forward nonconformance reports to the Contractor and follow up with:
 - a. Reviewing the response/resolution with the METS Rep and/or BD Structure Project Engineer.
 - b. Documenting closure of issue.
 6. Verify with the METS Rep that testing methods and frequencies are compliant per [QASI Manual](#).
 - iii. After field welding:
 1. Receive welding reports from the Contractor:
 - a. Forward a copy to the METS Rep for review.
 - b. Monitor review times to stay within the allotted timeframe, which differs for steel field welded pipe piling, bar reinforcement in CIP

concrete piling, and overhead sign structures, standards, and poles. Refer to the *Contract Specifications*:

1. Section 11-2.03C, *Welding – Welding Quality Control – Submittals – Welding Report*
 2. Section 11-3.03, *Welding – Welding for Overhead Sign Structures, Standards, and Poles – Submittals*
- c. Authorize or reject welding report(s) per contract requirements and guidance from the METS Rep before encasing welds in concrete.
- d. Other than steel pipe piling and reinforcement in CIP concrete, the Contractor may elect to encase welds in concrete at their own risk prior to receiving authorization.
- c. For field welding not performed to CS, Section 11-2, *Welding – Welding Quality Control*, like joint seal assemblies:
- i. Before field welding:
 1. Consult with the METS Rep on the inspection and acceptance process by the QA inspector.
 2. Verify scheduling and timing of inspections.
 3. Verify that the Contractor's QC inspector meets the requirements of AWS D1.1.
 - ii. During field welding:
 1. Verify that the Contractor's QC inspector is present during welding.
 2. Work with the METS Rep to verify that welder qualifications, welding processes, and QC inspection are being spot checked by the QA inspector as discussed before field welding.
 3. Review QC inspection documentation in conjunction with the METS Rep.
- d. Welding work must be identified as part of the project Fire Prevention Plan, *Hot Work*.
- e. Public safety must be considered and maintained during all welding operations and testing, using the following:
1. Visual barriers required to protect pedestrians during welding, which includes a glare shield or welding screens.
 2. Additional work zone protections where non-destructive test methods like radiography requires a minimum clear distance.
- f. Verify the Contractor's Stormwater Pollution Prevention Plan (SWPPP) follows:

1. The Division of Construction, *Construction Site Best Management Practices (BMP) Manual*, [Construction Site BMP Fact Sheets](#):
 - a. [NS-13](#), *Material and Equipment Use Over Water*.
 - b. [WM-5](#), *Solid Waste Management*.
2. Proper maintenance during all welding operations, including to:
 - a. Collect all welding slag and rod for proper disposal.
 - b. Provide adequate containment to prevent falling weld debris.
- g. Document all inspection, construction, and quality assurance activities, pertinent to this BCM, in the Daily Reports per [BCM C-7](#), *Daily and Weekly Reports*.
5. Following construction, the SR must:
 - a. Confirm all nonconformance reports are resolved and documented before accepting the project.
 - b. Provide as-builts and include location of all splices per [BCM C-6](#), *Required Documents to be Submitted During Construction*.
6. File all project documentation (correspondence, materials acceptance documentation, Daily Reports, etc.) in the appropriate category in the project records as specified in the *Construction Manual*, [Section 5-102](#), *Organization of Project Documents*.

Process Outputs

1. Daily Reports
2. Authorized WQCP and repair procedures
3. As-Builts

Attachments

[Attachment 1](#). *Welding Terms*